4 MINUTE READ

Mud Mountain Fish Passage

from **Engineering With Nature: An Atlas, Volume 1.**

by **US Army Engineer Research and Development Center**

Buckley, Washington, United States

Mud Mountain Dam in Enumclaw, Washington, was constructed in 1948 by the U.S. Army Corps of Engineers (USACE) as a means of protecting area residences and businesses from flooding. While the dam itself was being developed, USACE also constructed a trap-and-haul facility to enable fish passage upriver. The facility captures Endangered Species Act (ESA)-listed salmon and other species, and—as part of operations—conveys the fish by truck upstream from the dam. The 70-year-old trap-and-haul facility, which was designed to move 20,000 fish annually, falls short of meeting current fish-passage needs. After a 2014 National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) Biological Opinion (BiOp) issued redesign recommendations, it was decided that a new facility should be built so these recommendations could be addressed. The new facility is designed to transport 60,000 fish per day. Projected to be completed in 2020, USACE Seattle District (NWS) broke ground on the project in 2018; the Kiewit Infrastructure West Company was awarded the contract by USACE to build the facility.

Article cover: Masses of pink salmon eddying near the existing barrier. (Photo by the Puyallup Tribe)

Producing Efficiencies

The fish (including threatened Chinook salmon, steelhead and bull trout, as well as Coho, pink, and chum salmon) will swim through five gates to an entrance pool; next, they will swim up a fish ladder with 10 pools to two presort holding pools. The fish will then travel through augers to distribution/sort flumes where they will get loaded into a truck, moved to the Muckleshoot Indian's broodstock collection, or monitored. The fish will then be transported upstream of the dam, where they will be released into the river via a flume. Trucks with a capacity to carry 4,500 gallons per trip will transport up to 60,000 fish in one day; as a means of comparison, the trucks currently in use have a holding capacity of only 1,200 gallons per trip. The smaller-capacity trucks will be maintained with the new fleet.

Current fish trap loading salmon.
(Photo by the Puyallup Tribe)

Using Natural Processes

The facility's design works with the natural forces provided by the White River to maximize fish passage efficiency. A series of fishway entrances 7 feet high with a half-foot to two-foot head drop head drop will be used with a forty-foot-wide broadcrest weir 400 cubic feet per second that is gravity fed to direct fish through the passage. A combination of ice harbor baffle (for Coho and steelhead), orifice (pink/Chinook) salmon and water supply chimney weirs and pools is being designed to facilitate the upstream and downstream movement of fish consistent with the swimming speeds of the

target fish and to provide resting areas. Once completed in 2020, it will be the largest trap-and-haul fish passage facility in the U.S.

Excavator clearing the shoreline areas along the river, preparing for construction of the new facility.

(Photo by USACE Seattle District)

Broadening Benefits

The new facility will provide a number of benefits. It will safely transport a larger number of ESA-listed Chinook salmon and steelhead and bull trout up the White River so they can reach spawning and rearing grounds. This will ensure these populations will grow to even healthier numbers, providing ecological benefits to the wildlife in their ecosystems and economic benefits to people involved in industries associated with them.

The runs in the new facility are crucial to the recovery of these fish species throughout Puget Sound. Additionally, the fish are also important to the recovery of endangered Puget Sound orcas that rely heavily on Chinook salmon for food. The facility will also help ensure Muckleshoot and Puyallup Tribes' treaty rights to fish on the White River.

Above two images: Completed physical model of the new barrier structure and fish passage facility located downstream of Mud Mountain Dam in Buckley, Washington. The model is a 1:20 scale of the planned facility USACE Seattle District is currently designing. (Photo by USACE Seattle District)

Promoting Collaboration

For the new facility's design, USACE integrated input from approximately 150 employees from three different districts; two architecture and engineering firms; the Muckleshoot Indian Tribe; the Cascade Water Alliance; and the NMFS. Over the course of the project, USACE will continue to collaborate with all stakeholders, including the NOAA, the U.S. Fish and Wildlife Service, the tribes, and state of Washington officials to ensure that the final fish passage design incorporates measures needed to ensure safe passage of ESA-listed salmon and trout upstream and downstream of Mud Mountain Dam.

Complete CAD design of the new barrier structure and fish passage facility.
(Image provided by Bill Dowell, USACE Seattle District)

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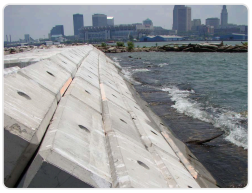

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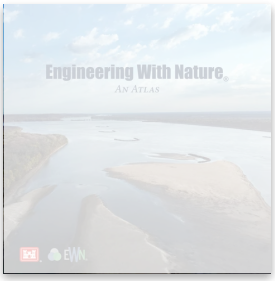

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